

## ICCGE-17 ABSTRACT

### Crystal Shape Evolution in Detached Bridgman Growth

M. P. Volz<sup>a</sup>, K. Mazuruk<sup>b</sup>

<sup>a</sup>NASA, Marshall Space Flight Center, EM31, Huntsville, AL 35812, USA

<sup>c</sup>University of Alabama in Huntsville, Huntsville, AL 35762, USA

#### Abstract

Detached (or dewetted) Bridgman crystal growth defines that process in which a gap exists between a growing crystal and the crucible wall. Existence of the gap provides several advantages, including no sticking of the crystal to the crucible wall, reduced thermal and mechanical stresses, reduced dislocations, and no heterogeneous nucleation by the crucible. Numerical calculations are used to determine the conditions in which a gap can exist. According to crystal shape stability theory, only some of these gap widths will be dynamically stable. Beginning with a crystal diameter that differs from stable conditions, the transient crystal growth process is analyzed. In microgravity, dynamic stability depends only on capillary effects and is decoupled from heat transfer. Depending on the initial conditions and growth parameters, the crystal shape will evolve towards the crucible wall, towards a stable gap width, or towards the center of the crucible, collapsing the meniscus. The effect of a tapered crucible on dynamic stability is also described.